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PROGRAM MAINTENANCE MANUAL. VOLUME II. WEAPON/TARGET IDENTIFICA--ETC(U)
MAR 77

UNCLASSIFIED CCTC-CSM-MM-9-74-VOL-2-5 NL

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DEFENSE COMMUNICATIONS AGENCY
COMMAND AND CONTROL
TECHINCAL CENTER
WASHINGTON, D.C. 20301

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IN REPLY
REFER TO: C314

13 June 1977

TO: RECIPIENTS 6

SUBJECT: Change 5 to Program Maintenance Manual, ~~CSM MM 9-74~~, Volume II, Weapon/Target Identification Subsystem. Change 5.

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1. Insert the enclosed change pages and destroy the replaced pages according to applicable security regulations.

2. A list of Effective Pages to verify the accuracy of this manual is enclosed. This list should be inserted before the title page.

3. When this change has been posted, make an entry in the Record of Changes.

FOR THE DIRECTOR

J. DOUGLAS POTTER
Assistant to the Director
for Administration

13 Enclosures
Change 5 pages

409658

EFFECTIVE PAGES - MARCH 1977

This list is used to verify the accuracy of CSM MM 9-74 Volume II after change 5 pages have been inserted. Original pages are indicated by the letter 0, change 1 pages by the number 1, change 2 pages by the number 2, etc.

Page No.	Change No.	Page No.	Change No.
Front Cover	1	342	4
Title Page	1	343-344	3
ii-iv	1	345-358	0
v	0	359	4
vi-vii	1	360-365	0
viii-xii	0	366-367	4
xiii	1	368	5
xiv	0	369-371	4
1-12	0	372-376	0
13	2	377	4
14-21	0	378-384	0
22-23	3	385	5
24-28	0	386-397	0
29-31	2	398-399	1
32-114	0	400-401	0
115-117	2	402-405	4
118-306	0	406	1
307-308	4	407-410	0
309	3	411	4
310-312	0	412	0
313	5	413	5
314-315	0	414	0
316	1	415	5
317	0	416-498	0
318	4	498.1	1
319	0	498.2	0
320	4	498.3-498.4	1
321-322	0		
323	4		
324-330	0		
331	4		
332	0		
333	1		
334-337	0		
338	1		
339	5		
340	4		
341	0		

Table 17. (Part 3 of 7)

BLOCK TYPE	MAXIMUM LENGTH/ ACTUAL LENGTH	VARIABLE OR ARRAY	DESCRIPTION
Depenetration Corridor Point /DPOOL/	150/(NDPEN X 3)	DPLINK(50)	Depenetration corridor link
		DPLAT(50)	Depenetration corridor latitude
		DPLONG(50)	Depenetration corridor longitude
Recovery Point /DPOOL/	600/(NRECOVER X 5)	RECLINK(200)	Recovery point link
		RECLAT(200)	Recovery point latitude
		RECLONG(200)	Recovery point longitude
		IRECPCTY(200)	Recovery capability
		INDREC(200)	Recovery name
Refuel Point /DPOOL/	40/(NREF X 2)	RELAT(20)	Refuel point latitude
		RELONG(20)	Refuel point longitude
Boundary Point /DPOOL/	1000/(NBNDRY X 5)	BPLINK(200)	Boundary point link
		BPLAT(200)	Boundary point latitude
		BPLONG(200)	Boundary point longitude
		BPZONE(200)	Zone circumscribed by this link list
		NEXTZONE(200)	Zone exterior to line defined by this point and point to which it links
Complex, Multiple Target Data /TD/,(MLTX/	Variable in 34- and 8-word segments	TGTNAME . : MAXCOST	34-word record as on TINFILE for each element of a complex target
			8-word record for each multiple target element; variables shown below
		TGTNAME	Target name
		INDEXNO	Target index number
		DESIG	Target designator code
		TASK	Target task code
		CNTRYLOC	Target country location code
		FLAG	Target flag code
		TGTLAT	Target latitude

Table 17. (Part 4 of 7)

BLOCK TYPE	MAXIMUM LENGTH/ ACTUAL LENGTH	VARIABLE OR ARRAY	DESCRIPTION
		TGTLONG	Target longitude
		ZZZZZZ	= 6HZZZZZZ end sentinel
Warhead Table /C2/	150/(NWHDTYPE X 3)	YLD(50)	Yield
		PDUD(50)	Dud probability
		FFRAC(50)	Fission fraction
ASM Table /C2/	100/(NASMTYPE X 5)	IWHDASM(20)	ASM warhead type
		RANGEASM(20)	ASM range
		RELASM(20)	ASM reliability
		CEPASM(20)	CEP of the ASM
		SPEEDASM(20)	ASM speed
Payload Table /C2/	400/(NPAYLOAD X 10)	NOBOMB1(40)	Number of bombs of type 1
		IWHD1(40)	Type index of first bomb
		NOBOMB2(40)	Number of bombs of type 2
		IWHD2(40)	Type index of second bomb
		NASM(40)	Number of ASMs
		IASM(40)	ASM type
		NCM(40)	Number of countermeasures
		NDECOYS(40)	Number of decoys
		NADECOYS(40)	Number of area decoys
		IMIRV(40)	MIRV system identification number
Region /C2/	20/NREG	CCREL(20)	Command and control reliability
Weapon Type /C2/	1600/(NTYPE X 20)	IHWTYPE(80)	Weapon type name
		RANGE(80)	Weapon range (nautical miles)
		CEP(80)	Weapon CEP (averaged)

Table 19. (Part 15 of 15)

BLOCK	VARIABLE OR ARRAY	DESCRIPTION
C12 (cont.)	CPLX/ICPLX(I,J) (I = 30, J = 210) (cont.)	29 correspond to the same variables in common block /TD/. ICPLX(30, J) is a copy of the complex number.
	LOOK(30)	Hold area for LSRTA and LSRTB data
	GRPCOMP/IGRPCOMP(I,J) (I =5, J = 2500)	Array containing data for each weapon in a group. For each group element J, I = 1: base country location and index 2: base latitude 3: base longitude 4: base name 5: number of first vehicle/number per base/base payload index
C4	NDEXG(210)	Hold array containing the ordered group indexer
	IORDER(210)	Reordered group array
C5	TARLST/CURPGE(3516)	In core "page" of target list (TARLIST)
	SRCPAD(3516)	Scratch pad of DESIG strings and items
	SCAT(7771)	Hash ordered array of "page" and target designator string pointers
	MAXPPG	Maximum number of words in a TARLIST page (3516)
	MXSCAT	Maximum number of entries in the SCAT array (7771)
	MAXSRC	Maximum number of words in the SRCPAD array (3516)
	LAVSPG(15)	Pointers to lists of available space for TARLIST pages 1 through 15
	MXPGS	Maximum number of TARLIST pages (15)
	INCR	Number of words in target designator string item (6 words)

7.6 Overlay TARLST

PURPOSE: Generate TARFILE

ENTRY POINTS: TARLST

FORMAL PARAMETERS: None

COMMON BLOCKS: C5, EDITAP, EDITER, FILABEL, ITP, MYLABEL, MYIDENT, NOPRINT, PLSTCL, PROCESS, TAPES, TWORD, WT

SUBROUTINES CALLED: ABORT, CHANGE, IHASH, INITAR, INITED, IT, INITPG, INPITEM, NEXTITEM, RDARRAY, SETREAD, SETWRITE, TERMTAPE, WRARRAY, WRWORD

Method:

TARLST is the last overlay within PLANSET and is called to create the final version of TARFILE. In the original design of PLANSET, TARLST was the first overlay executed, hence, the reason for its being presented in this document prior to the other overlays. The flowchart for TARLST is shown in figure 66. TARLST first reads the temporary version of TARFILE as written by subroutine CALCOMP and stores the information read. This data contains the hardest vulnerability for each complex where the representative target is not the hardest element. TARLST, then, reads one item at a time from the INDEXDB (or INMODDB) tape. If the item is an appropriate data base item, the target designator code (DESIG) is used to calculate a storage address in the hash ordered array SCAT. If the SCAT array entry at the calculated address is empty, the current TARLIST page number (KCPG) and the pointer index (INDX) to the storage area in the current page (CURPGE) are packed into the SCAT array entry. The item information LAT, LONG, DESIG, ISIX, FLAG, TARDEFHI, CNTRYLOC, TASK, CNTRYOWN, H1, and INDEXNO are packed and stored in six consecutive words of CURPGE beginning at the address INDX.* The target designator string pointer (ISIX) is set to zero to indicate that this is the first item in the DESIG string. If a subsequent item DESIG calculates the same hashed SCAT address (and the indicated page (IPG) for the previous DESIG(s) is currently in core) the pointer in the SCAT entry (INDX) is changed to point to the new item and the new item string pointer (ISIX) is set to point to the predecessor item. If the indicated page (IPG) is not currently in core the item information is stored in a "scratch pad" in the same packed format as that of the TARLIST entries. The string pointers (ISIX) for these scratch pad items are set to '9999' as a flag for later reprocessing of the TARLIST pages. As pages of the TARLIST are filled in this manner they are output on the intermediate scratch file (IOUT). If a string of DESIGs were to overflow a page as it is filled, the string is "pulled" and stored in the SRCPAD. The pointer in the SCAT entry is changed to point to the SRCPAD string and the SCAT entry is set

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*See figure 67 for a description of the packing of this data.

five consecutively indexed sites from the same squadron. Whenever an eligible missile site is encountered, a check is made to see if a multiple target is currently being processed. If not, one is started by retrieving the target data and storing it in the array MULT. The target counter (NTAR) then is incremented by one, as is the counter for the number of sites in the multiple target (NMULT), and the attributes NAME, INDEXNO, DESIG, TASK, CNTRYOWN, CNTRYLOC, FLAG, LAT and LONG are stored in the array MLTX. If a multiple target was being processed, the new site is added by incrementing the site counter NMULT and storing the appropriate attributes in array MLTX. Subroutine WRMULT is called whenever a multiple target is to be terminated; this occurs if any of the multiple criteria fail.

Targets which are not missile sites are separated into individual targets and targets which belong to a complex. For individual targets, the target data are retrieved and immediately written on an intermediate target file (LTTGT). When a complex target is encountered, the number of targets in the complex is incremented and stored by a complex in array NCPX. The maximum complex index (ICOMPLEX) is found and stored under MAXICOMP. Target data then are retrieved and stored in the target array, ITD. The first target in each complex is indicated by placing "1" under ITD(30); for all other targets in the complex a "2" is placed in this word after counters for the number of complexes (NCOMPLEX) and number of targets (NTAR) have been incremented. ICOMPLEX is stored under ITD(7) to distinguish the target as belonging to a complex, and the target data array is written into the target file (LTTGT). For all elements of complexes vulnerabilities are temporarily stored in ITD(12) and ITD(16) for use in subroutine CALCOMP. For each target processed a single word is written onto WINFILE for print by overlay SHUFF1. This word contains the FLAG and the DESIG of the target.

Weapons Processing: If the item being processed is the first site of a missile squadron (ISITE=1) or a bomber on the attacking side, and if auxiliary class WTCL has been defined (CHK(ITYPE) = 1), weapon type data which are the same for all weapons of the given type are defined from array WTP. This array was loaded from the WTCL entry. In the case of a missile, however, before PLANSET fills the WTP array, it checks the retargeting flag (IRETARG). If on, the user has requested that the data base attribute IREP (reprogramming index) be considered for all missiles. PLANSET then calculates and stores for the current missile type the factors that later will be used to modify the number per squadron, number on alert, alert DBL probability, and reliability for all missiles of that type. The new values will reflect the type of reprogramming capability indicated by IREP. If the IRETARG flag is off, no modifications for retargeting capabilities are made (these calculations are described in the Analytical Manual, Volume II, Chapter 2, Missile Reprogramming).

At each appearance of a WTCL data item, the type characteristics are output to the WTCLDATA file for printing later in the program. The data for the Ith type (i.e., plan generation type LTYPE=I) is placed in the Ith sector of the WTCLDATA file.

After type data has been defined, missiles and bombers are aggregated to form weapon groups. A weapon group consists of weapons from up to 150 bases. If all the weapons on a given base are nonalert, weapons of the same type are considered as one group. Otherwise, a group comprises those weapons on a base which have the same alert status (IALERT), type (ITYPE), region (IREG), naval data (IDBL, PKNAV), and payload. Bombers must also have the same refueling index (IREFUEL). The maximum number of warheads allowed per group is set at 1,000. Also, for missile classes the maximum number of weapons per salvo is set at 15; if exceeded, a new missile group is formed.

BOMBER units which do not refuel and missile sites must lie within a geographic region which, for alert weapons, has a radius equal to a certain percentage of the range of the weapon. This percentage is read into the variable RANGEMOD at the beginning of the program; if the percentage is not specified in the data cards, it is assumed to be 15%. For nonalert weapons, this distance criterion is automatically doubled.

In order to form a weapon group, the required radius is expressed in terms of latitude (DLAT) and longitude (DLONG), and the number of bases (NTOTBAS) is counted. If some bombers are to be used as tankers for refueling purposes (i.e., if IREFUEL= -2), the number in commission and the number on alert are cut in half. The number of weapons and total yield of the warheads carried by each vehicle on the base then are computed. Up to 200 groups can be formed for use in plan generation. However, PLANSET processes and prints information for up to 210 weapon groups to enable planners to adjust their data base should more than 200 groups be formed.

In addition, if the weapons have a time-dependent destruction before launch probability (DBL), then the spread in DBL between the first and last weapons must be less than the input parameter DMAXDBL. If the number of weapons on a base is so large that this criterion is not met, these weapons are split up. After the weapons are split, the program checks to determine if the weapons can be added to an existing group or if they must begin a new group.

When a new group is started group data are retrieved and stored in array GRP. The corresponding index to GRP and the attributes CNTYLOC, INDEXNO, LAT, LONG, and NAME are placed in the first five words of the array GRPX as each new base is added to the group. An index to vehicles on the base (ISTART) and the number of vehicles either on alert or in commission (NX) plus PAYLOAD are packed into the sixth word of GRPX. The array is written immediately onto the intermediate group file (LTGRP). As each new base is added, the group centroid is adjusted accordingly. If there are both alert and nonalert bombers on a given base, the alert bombers are tested for group assignment first using the distance criterion RANGEMOD; the nonalert bombers then are tested using the criterion 2 x RANGEMOD.

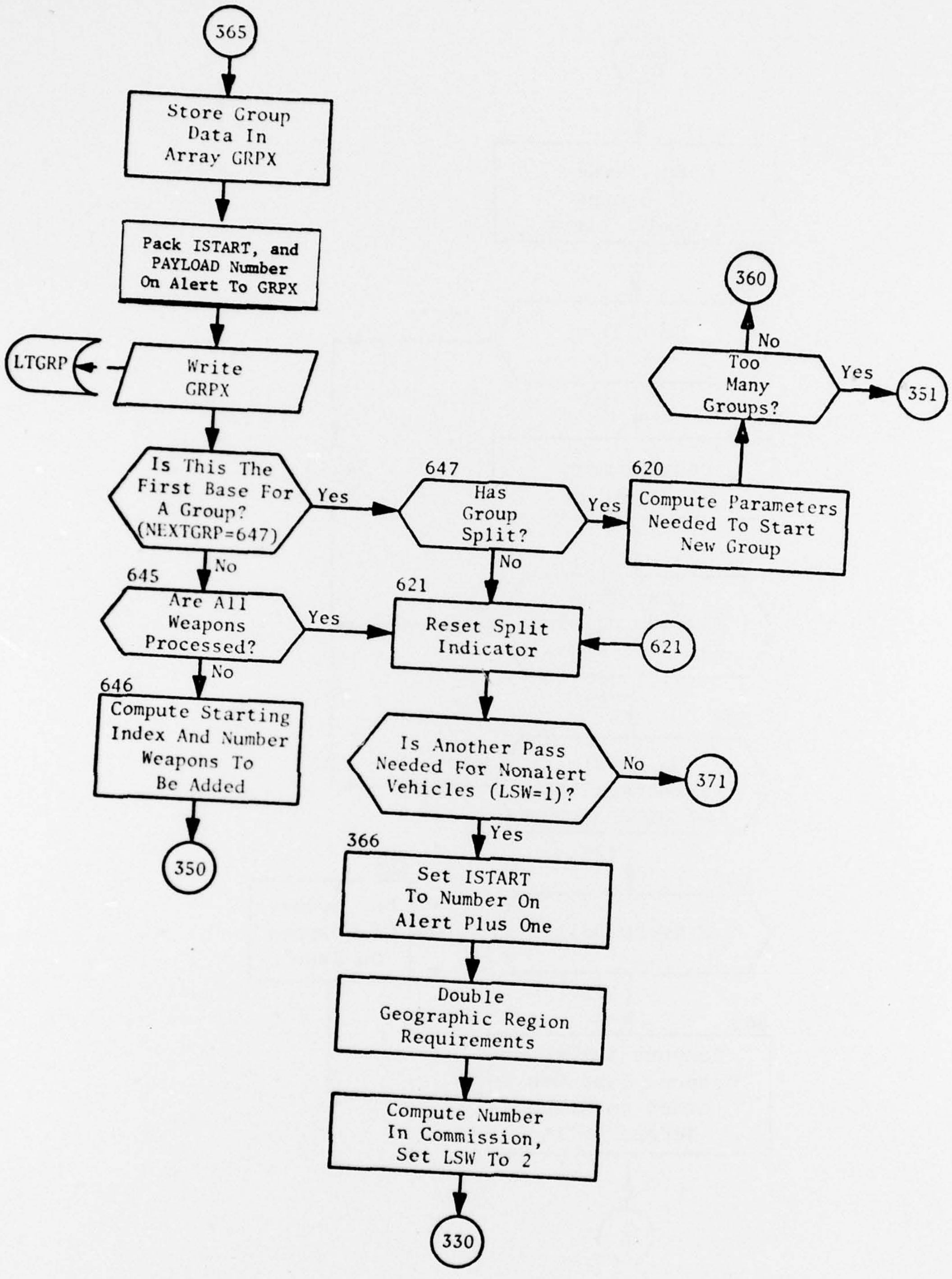

Figure 71. (Part 16 of 22)

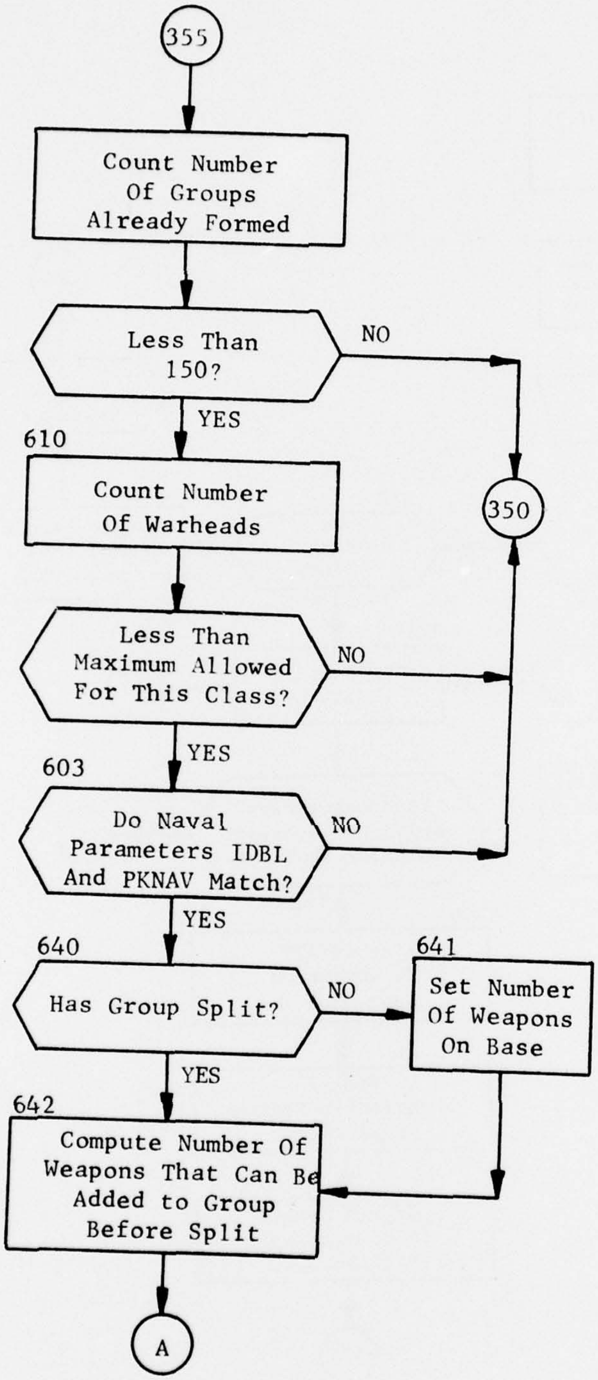

Figure 71. (Part 17 of 22)

7.9.2 Subroutine GRPSORT

PURPOSE:	To sort the weapon group, weapon base, and tanker data, and to write the data to WINFILE.
ENTRY POINTS:	GRPSORT
FORMAL PARAMETERS:	None
COMMON BLOCKS:	C12, C4, DIRECTRY, DPOOL, GROUP, ITP, MYIDENT, PLSTCL, PRCNTL, TAPES, TWORD, WAROUT, WT.
SUBROUTINES CALLED:	ABORT, RDARRAY, RDWORD, SETREAD, TERMTAPE, WRARRAY
CALLED BY:	SHUFF1

Method:

GRPSORT begins by calculating a breakpoint index (INDGRP) for each group formed in PLANSET, thereby reserving an area in array IGRPCOMP to accommodate the data for each base in the group. This group information, together with data for tanker bases, has previously been stored on the intermediate group file (LTGRP) by PLANSET. To distinguish between group and tanker data on LTGRP, the group number (between 1 and 200) was placed in the first word of each group data item, while a -1 or -4 was written as the first word for each tanker data item.

Tanker data which are preceded by a -1 is for tankers which are preassigned refuel areas in the data base, while data preceded by a -4 are for tankers which will be automatically allocated. The incoming information is separated by reading it into array JTANK for automatically allocated tankers (Code = -4), and into array ITANK otherwise. If the first word is positive, the incoming information is read into array IGRPCOMP.

For groups, the group number is also used to find the breakpoint index which corresponds to each group. Tanker data are stored in the order encountered; group data are stored in the next available location in the area designated by INDGRP and the group number.

After all items have been read and sorted, the group data (in array IGRP) and the group composition data (in array IGRPCOMP) are written onto the WINFILE for each weapon group. The group composition data then are printed if the user has requested it. Prior to the write of the array IGRPCOMP onto the WINFILE, certain data elements must be rearranged. Attribute NAME is temporarily stored for print purposes. This attribute will not be included on the output files. Reordering and repacking is conducted for final output definition. Finally, the tanker information (in arrays ITANK and JTANK) is written onto WINFILE, and control is returned to SHUFF1.

The flowchart for GRPSORT is shown in figure 79.

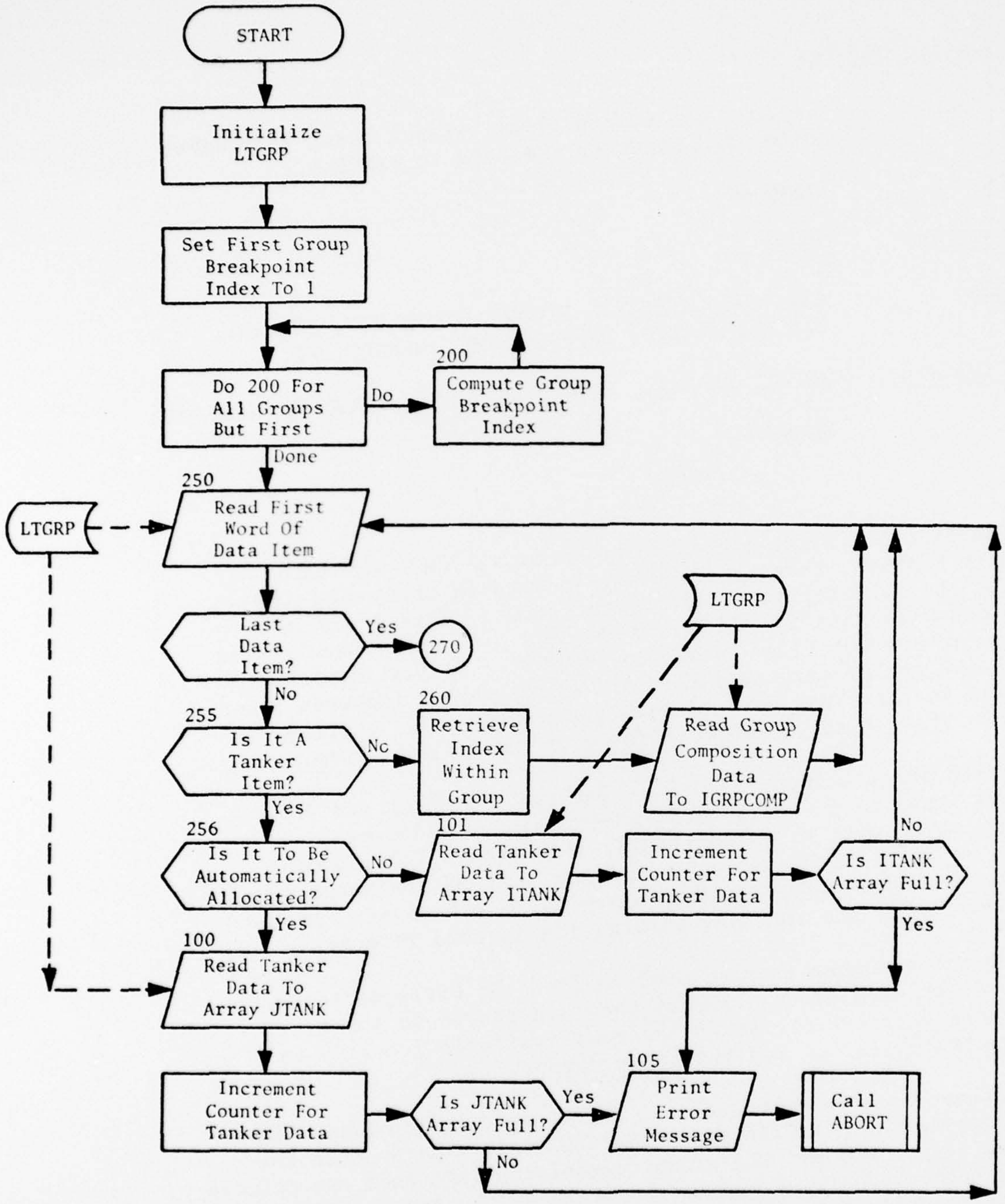

Figure 79. Subroutine GRPSORT (Part 1 of 2)

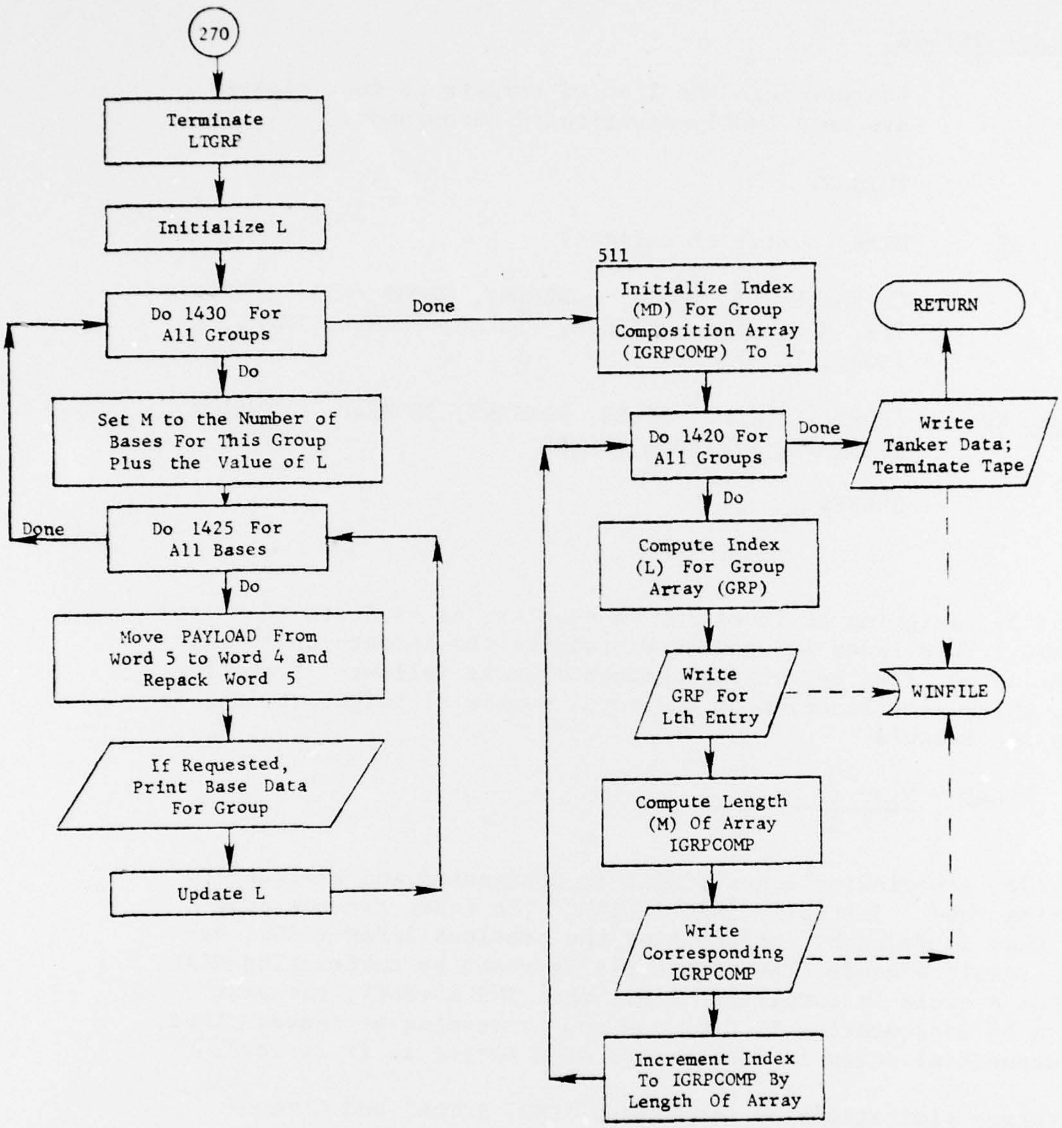

Figure 79. (Part 2 of 2)

7.9.3 Subroutine TGTSORT

PURPOSE: To rearrange the list of targets so that classes are more evenly distributed throughout.

ENTRY POINTS: TGTSORT

FORMAL PARAMETERS: NTAR (number of targets)

COMMON BLOCKS: CLASNAME, C1, DPOOL, DIRECTRY, GROUP, C12, IFTPRNT, ITP, MAX, MLTX, MYIDENT, PLSTCL, PRCNTL, TAPES, TWORD, TD, WAROUT

SUBROUTINES CALLED: ABORT, CALCOMP, ORDER, RDARRAY, SETREAD, SETWRITE, TERMTAPE, WRARRAY, WRWORD

CALLED BY: SHUFF1

Method:

TGTSORT begins by assigning an index IND to each target as it is read from the target tape. This index is used to distribute the targets uniformly throughout the target list by cycling through them as follows: a sorting index (LEAD), which is a function of the total number of Targets (NTAR), is calculated by the formula:

$$\text{LEAD} = \frac{\text{NTAR } (3 - \sqrt{5}\ )}{2}$$

To start a cycle, a beginning index (IBEG) is designated and assigned to the target being read. Initially IBEG = LEAD. The index for the next target (IND) then is found by incrementing the previous index (LAST) by LEAD. If the result exceeds NTAR, the cycle is reset by subtracting NTAR from IND. When a cycle is completed (i.e., when IND x IBEG), the next cycle is begun by incrementing IBEG by one and proceeding as above. Thus, a unique nonsequential index is assigned to each target as it is read.

Because of storage limitations on the arrays ITAR, ICPLX, and MLTCOMP several passes through the target list may be necessary before all data can be processed. In order to determine which targets are to be considered during a given pass, the index limits MIN (lowest target number in this pass minus one) and MAX (maximum number of targets which can be processed per pass) are established. These limits, together with the index, IND, are used to find an index (IT) to the column in ITAR in which data corresponding to IND are to be stored. The procedure is as follows.

As each target is encountered, the value of MIN for that pass is subtracted from the index IND corresponding to the target. If the result (IT) lies between one and MAX (210), the target data is stored